MultiMag

Magnetic bead extraction system

User Manual

Version : 1.1

IT IS IMPORTANT TO READ THIS MANUAL BEFORE USING THE MULTIMAG

Please read this manual carefully before using the MultiMag and make it accessible to all users. Failure to comply with the instructions in this manual will void the manufacturer's warranty and may pose a risk to the user.

Ensure all users are conversant with the instrument – contact Bee Robotics for any further instrument or training requirements if in any doubt before using the instrument

Consult User Manual where symbol (left) is seen on the instrument

CONTENTS

1 INTRODUCTION 3

2 TECHNICAL SPECIFICATIONS 3

3 UNPACKING AND INSTALLATION 4
3.1 Unpacking 4
3.2 Environmental Conditions 4
3.2.1 Bench Space 4
3.2.2 Ventilation 5
3.2.3 General 5
3.3 Initial Setup 5

4 SYSTEM OVERVIEW 6
4.1 Front View 6
4.2 Back View & Connections 6
4.3 Control Panel and Knob 7

5 ACCESSORIES AND CONSUMABLES 7

6 SAFETY & GENERAL INFORMATION 8
6.1 Safety Precautions 8
6.1.1 Instrument labelling 8
6.1.2 Detailed Personal Safety Information 8
6.2 Cleaning & Disposal 8

7 GLOSSARY OF MM8 TERMS 10

8 CORRECT FITTING OF PLASTIC CONSUMABLES 12
8.1 Magnetic pillar tubes 12
8.2 Elution strips 13
8.3 Extraction Tray 14

9 INSTRUMENT OPERATION 15
9.1 Overview 15
9.2 Switching on and selecting the Correct Protocol 15
9.3 Washing/Cleaning 16
9.3.1 Other Cleaning 16
9.4 Pausing Program 16
9.5 Completion of Extraction Process 17
9.5.1 Quick reminder. 18

10 TROUBLESHOOTING 18
10.1 Error Messages overview 18
10.2 Last run information screen 18

11 QUICK GUIDE PROTOCOL 19
11.1 Example : C100 DNA/RNA Virus kit 19

12 LIMITED WARRANTY 20

13 TECHNICAL SUPPORT 20

14 APPENDIX 22
14.1 APPENDIX I: Synopsis of Symbols used in manual & on instrument 22
14.2 APPENDIX VII: MSDS for typical C100/200 Kit used with the MultiMag 23

© Bee Robotics Jan 2010

1 INTRODUCTION

The MultiMag is a bench top automated system for extraction and purification of nucleic acids using magnetic bead technology.

The MultiMag processes one eight sample extraction tray. Reagents and wash solutions are added with mixing, magnetic bead capture, temperature and extraction of unwanted reagents all under automatic software control. The result is effective and efficient extraction of the target cell, protein or nucleic acid with in the disposable reagent tray.
The system design provides an efficient and truly “walk away” instrument with minimal set-up and shutdown steps.

2 TECHNICAL SPECIFICATIONS

Instrument type:	Stand alone benchtop
Processing Capability:	1 to 8 samples per run
Processing Time:	Typically 15 minutes to 25 minutes
Temperature Control:	Programmable from ambient to 90ºC
Processing Volumes:	50ul to 1.5 ml (binding stage)
Dispensing Mode & Accuracy:	Peristaltic pumps: ± 2%
Software:	Menu driven embedded software
Voltage & Frequency:	Bench Top Power Supply: 100-240V 47-63Hz Input; 24V 100W Output
Fuses	N/A
Dimensions:	170(H) x 330(D) x 530(W) mm
Weight:	10kg

© Bee Robotics Jan 2010

3 UNPACKING AND INSTALLATION

3.1 Unpacking

CAUTION: Take care when removing from its container

1. Visually inspect the container for transit damage.
2. Place the carton in an upright position to open.
3. Lift out the instrument and at the same time remove any protective foam and gently rest the instrument down on the bench.
4. Inspect the instrument for any obvious signs of transit damage.
5. Report any damage immediately to your local representative.
6. Check that the serial number on the instrument and the delivery note are the same.
7. Check that all accessories are present. Contents should be as follows:

MM8	MultiMag Automated Magnetic Bead Extraction System
MM8-BHS	Bottle Holder (x2)
MM8-PSU	24V 100W Bench-top Power Supply
ML-10	Mains lead for 24V power supply
USBL-2M	USB Lead

8. Store packing materials until you are completely satisfied that the instrument was delivered safely and that it is performing to specification.

3.2 Environmental Conditions

3.2.1 Bench Space

Always place the MultiMag in the pre-PCR Laboratory on a solid flat surface. Place the instrument so that there is no obstruction to the Control Panel on the top of the instrument. The **minimum** bench space required is 600mm width and 400mm depth. Ideally, the bench space should be 800mm width x 450mm depth.

Place the instrument a maximum of 1 metre from an appropriate power source.

The cover lid swings upwards, so that when at its maximum opening the height from the instrument base to the extreme of the lid is 350mm.

3.2.1.1 Disconnection guidelines

In an emergency immediately turn the power off and unplug from power source.
The mains switch and mains lead connection is on the bottom left of the instrument, to the left hand side as viewed from the front. The instrument should be 120mm from any rear wall so that there is ample clearance for the mains and waste module connectors, and to facilitate disconnection in an emergency. Do not place the instrument too close to any object that might impair emergency disconnection in an emergency, particularly any object to the right or rear of the instrument.

© Bee Robotics Jan 2010

3.2.2 Ventilation

Do not place the instrument in line with a direct draft such as an air vent. Otherwise there are no specific ventilation requirements for the instrument. Allow a space of 100mm between the instrument and any wall or other instruments.

3.2.3 General

Keep free of dust, harsh solvents and acidic vapours. Vibration and harsh sunlight must be avoided to ensure correct results. The MultiMag should always be placed on a flat stable surface. The MultiMag is intended for **indoor use only** and should not be subjected to unduly large variations in temperature and humidity. This instrument was designed for use in a typical laboratory environment, i.e:

Altitude:	Up to 2000m
Temperature:	Ambient temperature range: Between 5-30ºC
Humidity:	Maximum relative humidity 80% for temperatures up to 31℃ decreasing linearly to 50% relative humidity at 40℃
Power:	24V

Leave to stand for 3 hours before applying power to avoid problems that might arise from condensation.

The MultiMag meets the protection requirements laid down in the European Council directive 89/336/EEC on electromagnetic compatibility and carries a CE mark.

Storage conditions: from 5ºC to 30ºC

3.3 Initial Setup

After unpacking according to 3.1 above, place instrument on a bench according to 3.2 above.

Connect the 24V supply to the mains socket and the back of the instrument.

Lower the instrument lid. Switch ‘On’ the mains switch at the back of the instrument.

Press Knob : ‘MultiMag Initialising’ is displayed on the LCD screen. This takes a few seconds only.

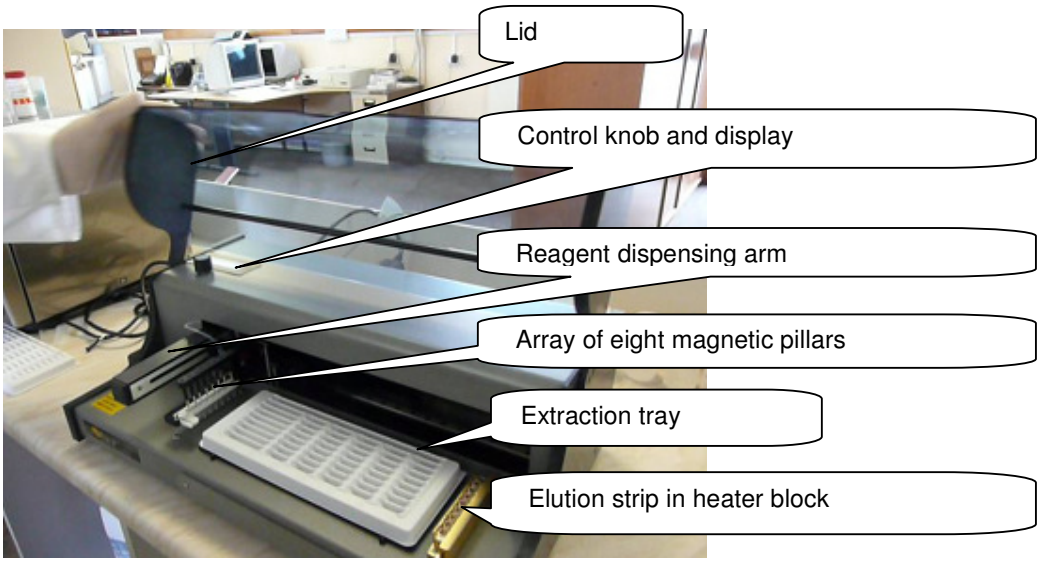
At the end of the initialization routine the LCD screen displays
‘MultiMag Press Knob’ indicating the instrument has been checked and is ready.

If a malfunction is detected, an error message will be displayed which may require the attention of a qualified service engineer. However, refer to section 13 TECHNICAL SUPPORT for more information and help

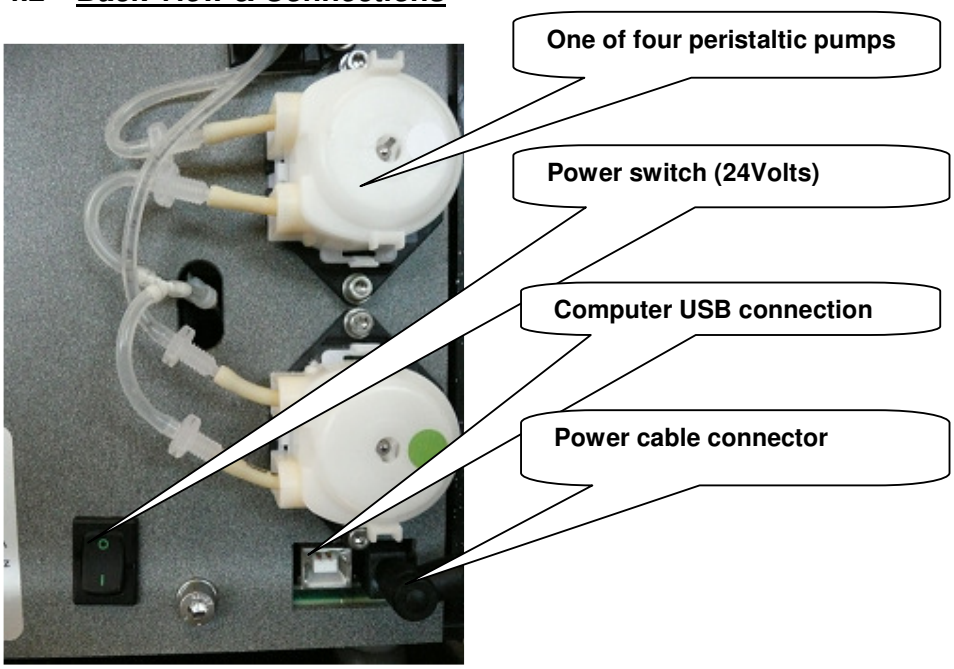
© Bee Robotics Jan 2010

4 SYSTEM OVERVIEW

4.1 Front View



4.2 Back View & Connections



Pumps 1 – 4 are used for the transfer of liquid reagents to the extraction tray. All pumps can be purged manually using the control panel.

© Bee Robotics Jan 2010

4.3 Control Panel and Knob

Each extraction protocol can be located and selected using the control knob and display

There is an LCD display showing instrument status, prompts and input requirements.

There is a single control knob which functions by turning or pressing.

Single Control Knob

5 ACCESSORIES AND CONSUMABLES

Catalogue No.	Item Description
MM-T1.1	Extraction tray
MM-ES1	Elution strips
MM-ET1	Elution tubes
MM-PCRT	Magnetic pillar tubes
MM-BOTS	Bottles set
MM-RTPP	Peristaltic pump tubes
MMK-C100	Extraction Kit – consult manufacturer
MMK-M100	Extraction Kit – consult manufacturer

© Bee Robotics Jan 2010

6 SAFETY & GENERAL INFORMATION

6.1 Safety Precautions

6.1.1 Instrument labelling

Please observe and respect all caution labels shown on instrument & consumables:

6.1.2 Detailed Personal Safety Information

The Heater plate and block of the MultiMag can reach temperatures of 90ºC during a run. Take care not to touch the heater plate at any time during or immediately after a run.

Avoid touching the MultiMag with wet hands, and DO NOT attempt to disassemble the MultiMag. In either case electrical shock may result, and in both cases the warranty will be invalidated.

It is recommended to wear eye protection, a laboratory coat and protective gloves when operating the instrument / handling reagents. If contact of any reagent occurs with skin or eyes, wash thoroughly with water.

Specimens should be handled as if infectious using safe laboratory procedures. Handle all samples as if capable of transmitting disease.
ALWAYS FOLLOW ACCEPTED HEALTH AND SAFETY PROCEDURES

6.2 Cleaning & Disposal

The MultiMag may be used with potentially infectious biological samples. Observe standard laboratory safety practices at all times.

Cleaning of the MultiMag should be performed regularly using proprietary decontaminants followed by water and appropriate detergent. Normally, cleaning of the carousel and fixed tray below is most important:

- ALWAYS wear protective gloves prior to cleaning.
- Use an appropriate detergent to clean surrounding surfaces.

© Bee Robotics Jan 2010

- Use a cloth, dampened in detergent and wipe all areas in and around the extraction tray area. Use the same technique to wash all parts that may come in contact with any accidental spillage.

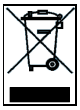
The instrument will automatically clean all of the reagent and waste lines provided the user follows the onscreen instructions (see **9.8**) at the end of each run. All the hazardous substances will be contained in the waste bags and in the reagent containers, should any reagents be left at the end of any run.

When disconnecting waste bags at the end of any run, disconnect the waste bag connector luer then replace with luer caps provided in every kit on inlet of waste bags, and handle waste bags very carefully – do not squeeze under any circumstances. Replace waste bags per kit used.

No other drainage system is required with waste & reagent disposal from the instrument. The maximum waste in any waste bag is 250ml, and a typical reagent kit will produce approx 360ml of waste divided into two 250ml bags.

DISPOSAL:
Dispose of any unused reagents and waste in accordance with country, federal, state and local regulations.

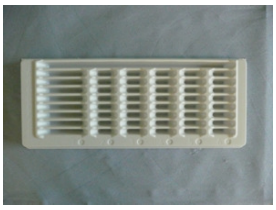
Instrument Disposal:



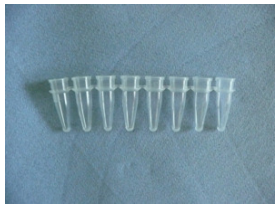
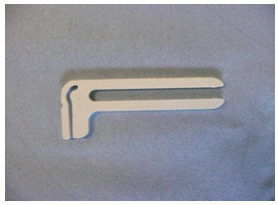
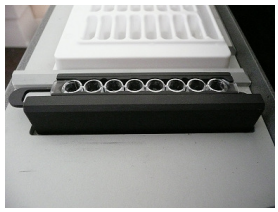
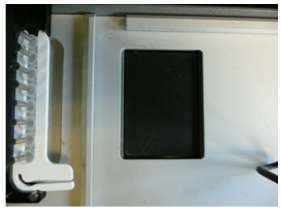
As part of the WEEE EU directives, this instrument should be returned to the manufacturer for dismantling at the end of its life

© Bee Robotics Jan 2010

7 GLOSSARY OF MM8 TERMS

Control knob: A single control knob for finding and selecting menus and starting/stopping operations	See 4.3
Display: Displays commands and information	See 4.3
Reagent dispensing arm: Travels over the extraction and locates two dispensing heads linked to the peristaltic pumps	See 4.1
Magnetic pillars: Permanent magnets that can be inserted in magnetic pillar tubes	See 4.1
Power supply socket: Only use the 24V power supply provided	See 4.2
Peristaltic pumps: Four pumps are located on the back of the MM-8	See 4.2
Extraction tray : A disposable plastic tray for extracting and purifying nucleic acids	

© Bee Robotics Jan 2010

Magnetic pillar tubes: A strip of 8 DNAse, RNAse free tubes (PCR tubes)	
Magnetic pillar tube support	
Elution strips: A strip of 8 of U shaped cups for elution of DNA	
Elution strip holder	
Heater block: A block in which elution cups or tubes are positioned. Normally set to 70 deg C	
Heater plate: A plate positioned underneath the left handside of the extraction that is used to warm lysis buffer in some protocols	
Reagent Bottle holders	

© Bee Robotics Jan 2010

8 CORRECT FITTING OF PLASTIC CONSUMABLES

Please take to fit these components correctly. **ALWAYS USE GLOVES.**

8.1 Magnetic pillar tubes

Note: the magnetic pillar tubes are DNase and RNAse free PCR tubes. Treat very carefully to avoid contamination.

Carefully slide **Magnetic pillar tubes** into white plastic **support**

Check that the two components have meshed together properly

Position **magnetic pillar tube holder** on the instrument underneath the magnetic pillars

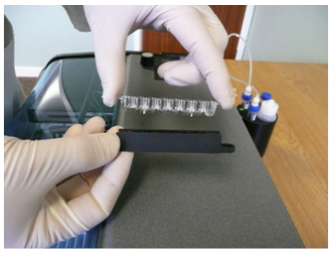
Check that the mechanism is working smoothly by lifting up and down.
If there is evidence of snagging, inspect carefully and relocate the white plastic support properly

© Bee Robotics Jan 2010

8.2 Elution strips

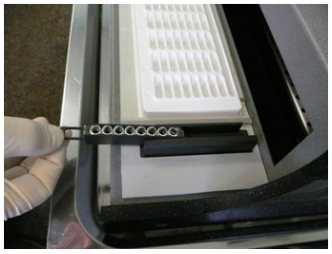
Note: the elution tubes are DNase and RNAse free PCR tubes. Treat very carefully to avoid contamination

Note carefully that the strip is notched at the '1' (first) cup position. The 1st cup position should be positioned away from the user
Mark the notched end with an indelible pen to identify the first tube



Position the elution strip in elution strip holder

Locate **elution strip holder** in the **heater block**
Note: The small handle is nearest the user**.**

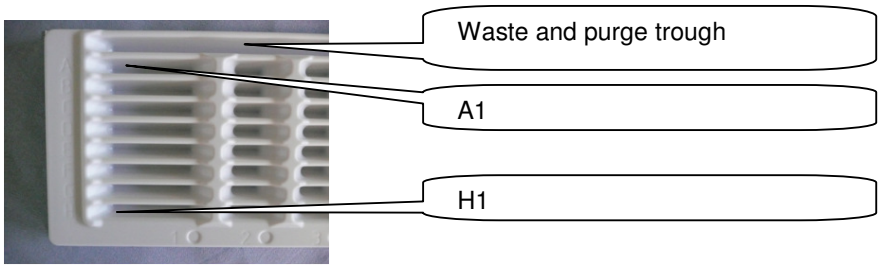


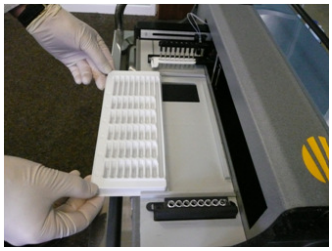
The small handle is used to position/remove the **elution strip holder**

© Bee Robotics Jan 2010

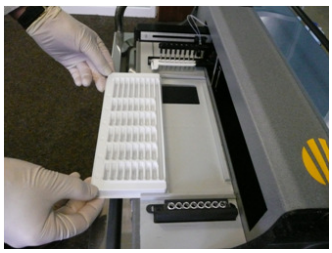
8.3 Extraction Tray

Label the tray with sample identification.
Carefully place appropriate volume of sample in the correct position starting at position A1 and proceeding to position H1.
Note: It is not very efficient to use fewer than 4 samples, however an extra 20% volume of reagent is provided so that this should be sufficient of 4 * 2 sample runs.





Slide the extraction tray into the extraction tray guide rails as shown



Correct position of tray.

(Push as far in as possible without too much force into the guide rails)

Remove for safe disposable by sliding tray towards you. Be careful! Do not spill contents!

© Bee Robotics Jan 2010

9 INSTRUMENT OPERATION

9.1 Overview

The MultiMag ON/OFF mains switch is located on the back of the instrument.

The MultiMag is operated by a single knob on the control panel on the front of the instrument. The control knob functions by turning clockwise or anticlockwise or by pressing down.

Turning	The control knob clockwise or anticlockwise will change a screen display: • to the next or previous screen display, or • to display either "Yes" or "No", or • to select a number e.g. no. of samples
Pressing	the control knob indicates acceptance of the display message

9.2 Switching on and selecting the Correct Protocol

After switching on the MultiMag at the mains switch on the back of the instrument the following message is displayed. This routine checks basic software and mechanical functions.

MultiMag **Press Knob**

Invites user to press Knob to initialise the instrument

Lower lid and press Knob

The instrument performs a system self-check:

__ MultiMag __ **Initialising**

For about 10 seconds

Notes: in the event of a power failure (deliberate power cut or error), a message is displayed before the system check as a reminder. Try overriding this message by pressing the Control knob and observe whether the instrument initialises properly.
Refer to the section "Last run information screen" chapter 10.2 (p18)

__ MultiMag __ **Program No XX**

Invites user to select a protocol

Turn Control Knob Clockwise to select correct protocol

__ MultiMag __ **C100ul Virus v2**

Example of a protocol for viruses

Press Control Knob

PROGRAM SETUP **No.of samples: xx**

Select number of loaded samples by turning the knob

Press Control Knob

© Bee Robotics Jan 2010

_Program NO XX No of samples YY	*Asks user to confirm right number of samples and correct programme number.*

Press Control Knob to activate protocol.

Note: This should not be attempted unless the following sections have been read and understood.

9.3 Washing/Cleaning

Locate 15ml tubes containing 70% isopropanol/water in the appropriate wash positions.
Connect tube connector to the 15ml tube cap connector
Extraction tray set up

'Quick Demo' – Demo Program
Position an empty extraction tray in the instrument
'End of Run' wash – Cleaning Program
Leave the used extraction tray in position

Turn Control Knob

__ MultiMag __ Cleaning Program	*Protocol for washing tubes at the end of an extraction run*

Press Control Knob
Proceeds to pump 70% alcohol through the tubes.

9.3.1 Other Cleaning

In case of contamination of the work surface, wipe with a 3-5% solution of hydrogen peroxide. Do not leave for extended periods. In addition, if contamination is a recurring problem place the MultiMag in a cabinet that has an UV source, leave the MultiMag lid open and sterilise with UV light during - preferably – night time hours.

9.4 Pausing Program

During a run, the program can be paused by pressing the control knob for at least 1 second:

Push Control Knob for 1 second

Pause Program ? No	*Prompt to continue the program*

Pressing the control knob, the system returns to the "Program running" display.

Turn Control Knob:

Pause Program ? Yes	*Prompt to pause the program*

By pressing the control knob, the system pauses the program.

© Bee Robotics Jan 2010

Press Control Knob:

PROGRAM PAUSING **Please wait**

Indicates program pausing is in progress

When the program is paused:

PROGRAM PAUSED **Restart Program**

Prompt to restart the program

Please note during pause some instrument functions will not pause and will continue e.g. pump priming/de-priming and heater

Press Control Knob:

Program **restarting**

Indicates the program is restarting
Remark: a carousel loading scan is also performed at this stage

When the program has restarted:

PROGRAM RUNNING **_____**

Indicates the program is running

9.5 Completion of Extraction Process

When the extraction is completed the display shows:

PROGRAM COMPLETE **Press button...**

Indicates the extraction is completed

Pressing the button (Control Knob) will bring the screen back to the main menu.

The Heater Block of the MultiMag can reach temperatures of 90ºC during a run, and is still hot at the end of a run. Take care not to touch the heater block..

Remove elution block. Take care as it the temperature may still be 60 deg C. Leave on the work bench to cool.

At this point refer to 9.3 Washing/Cleaning.

© Bee Robotics Jan 2010

9.5.1 Quick reminder.

- ***Connect tubes to 70% isoprop tubes***
- ***Leave extraction tray in position***
- ***Press Control Knob to start tube washing***

Finally:

Remove extraction tray and dispose

Remove **Magnetic pillar tubes**

Switch Off power

10 TROUBLESHOOTING

10.1 Error Messages overview

In the event of a system failure or fault the MultiMag will alert the user as follows:
- An audible signal will be heard.
- The LCD screen on the control panel will display an error message described below (example):

0908000000111111 2244445509996666	*The user must make a note of the error code and report it as soon as possible to the local agent or Bee Robotics.*

- Usually errors mean that the instrument has to be restarted. Before performing any other runs, consult the local agent or Bee Robotics to determine the cause of the error.

10.2 Last run information screen

In the event of an error during the previous run, a message is displayed as a reminder before the System Check, after switching on the MultiMag:

Either:

INFO. LAST RUN: POWER FAILURE	*Indicates there was a power failure during the last run and the program could not be completed.*

Or:

INFO. LAST RUN: GENERATED ERROR	*Indicates there was an error during the last run.* *It is advisable to contact a service engineer.*

Press Control Knob:
The instrument performs a system check as usual:

__ MultiMag __ System Check

© Bee Robotics Jan 2010

11 QUICK GUIDE PROTOCOL

All the kits sold by BeeRobotics have a similar format as follows:-

Bottle Color Code	Reagent
Black	Lysis buffer (sometimes combined with bead/binding in Green bottle)
Green	Bead and Binding buffer (sometimes contains lysis agent)
White	A wash buffer containing chaotropic salts and other wash consitituents
Yellow	Alcohol based buffer
Green	Elution buffer

11.1 Example : C100 DNA/RNA Virus kit

Reagent preparation
Mix the magnetic beads with the binding buffer (Green)

Fitting plastic consumables
See section 8

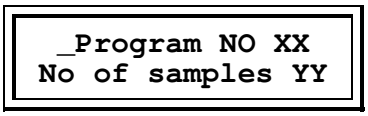
Reagent position on instrument
Follow the color guide on the round black bottle holder
Note: To aid mixing of the bead/binding buffer always use a 15 ml tube and use an approximate volume for the run + **1ml excess**.
Position each bottle in the Reagent bottle holder according to the colour code
Connect each tube according to color code.

Sample preparation
Remember to label reagent tray, starting with A1 and proceeding to H1.
Use 100ul of diluted viral transport medium (This assumes 1 nose/throat swab per 1 – 3ml).
Other samples such 10ul buccal cells diluted with 80ul water may also be used
Add 100ul lysis buffer and 5 ul PK to each sample and incubate for 10 minutes at 55 – 60 deg C in an air incubator.

Instrument start up
Select the appropriate Protocol (C100 Virus)
Wait until the lysis is completed and position the extraction tray in the instrument (see section 8.3)
Complete the start up process by responding to the last prompt.

Select number of loaded samples by turning the knob

Press Control Knob:



Asks user to confirm right number of samples and correct programme number.

The instrument will now complete the purification process.

Eluted samples
The eluted samples in the eluting strip (or tubes) are now ready for RT-PCR or PCR.

Storage
If the samples need to be stored then the 'tube' option should be used. (available in 2010).
Each tube will fit into a labelled screw cap tube available from BeeRobotics.

Closing down or continue with next run

© Bee Robotics Jan 2010

If more samples are to be extracted check carefully that there is enough reagent in each bottle and mix the bead/binding before starting new run.
Dispose of extraction tray and magnetic pillar tubes ready for a new set
If no more extractions are required then leave extraction tray in position. Disconnect green and white connectors and re-connect to yellow 15ml tubes. (Its not necessary to reconnect the red and yellow bottles)
Select 'Wash'. The tubes will be washed out with 'yellow' buffer.
Dispose of extraction tray
Power down MultiMag

12 LIMITED WARRANTY

Please note the serial number of the MultiMag (found on the back of the instrument) below for future reference

SERIAL No. ……

Warranty

Bee Robotics Ltd. warrants that each product described herein will be free from defects in materials and workmanship for a period of one year from the date of delivery. Bee Robotics Ltd. agrees, as its sole responsibility under this limited warranty, and upon prompt notice of the defect, to repair or replace any product found to be defective within the warranty period.

The limited warranty is not applicable to: (1) abnormal wear and tear (2) abuse, unreasonable use, improper installation, mistreatment, or neglect (3) damage caused by equipment or system with which the product is used (4) damage caused by modification or repair not made or authorised by Bee Robotics Ltd., or (5) theft, vandalism, fire, water or other peril. Product may not be returned without proper authorisation from Bee Robotics Ltd.. Cost of transportation, removal, or reinstallation of the equipment will be paid by the purchaser. This warranty and the remedies set forth herein are exclusive and in lieu of all other express or implied (including any implied warranties or merchantability or fitness for a general purpose), and no other representations or claims shall be binding on or obligate Bee Robotics Ltd. in any way. In no event will Bee Robotics Ltd. be liable for any special, incidental, or consequential damages resulting from use or malfunction of this product or the equipment or system with which it is used, loss of revenue, or cost of replacement of goods.

13 TECHNICAL SUPPORT

Manufactured By: **BEE ROBOTICS LIMITED, 32-33 Cibyn, Caernarfon, Wales, UK.**

For all technical support and assistance, contact:

Technical Department
Bee Robotics Ltd.
32-33 Cibyn
Caernarfon
Gwynedd
Wales, UK
LL55 2BD

Tel: +44 (0) 1286 672744
Fax: +44 (0) 1286 678322

Web: www.beerobotics.com
E-mail: enquiries@beerobotics.com

There are no user serviceable parts within the MultiMag.

© Bee Robotics Jan 2010

Only by Bee Robotics or associated trained service personnel may repairs and servicing be carried out.

For further details of instrument or to arrange for training to be given on the instrument, contact Bee Robotics at above address.

© Bee Robotics Jan 2010

14 APPENDIX

14.1 APPENDIX I: Synopsis of Symbols used in manual & on instrument

Symbol	Colour	Publication	Description	Placement
	Symbol & Outline: Black	IEC 60417 – 5032	Alternating Current	Instrument Serial Label
	Symbol & Outline: White	IEC 60417 – 5007	On (Supply)	Inlet Filter
	Symbol & Outline: White	IEC 60417 – 5008	Off (Supply)	Inlet Filter
	Background: Yellow Symbol & Outline: Black	IEC 60417 – 5032	Caution, Hot Surface	On Heater Plate
	Background: Yellow Symbol & Outline: Black	IEC 60417 – 5007	Caution, Risk of Danger	On Waste Station On Control Panel near Red LED – Symbol & Outline: White, no bgcolour
	Background: Yellow Symbol & Outline: Black	ISO 7000 - 0659	Biohazard	On Waste Module
	Symbol & Outline: White	-	Power	On Control Panel near Green LED (Power Indicator)
	Symbol & Outline: White	-	Pause	On Control Panel near Yellow LED (Program Paused Indicator)
	Symbol & Outline: White	-	Insert Smart Card	On Control Panel near entry slot of Smart Card
	Symbol & Outline: White	-	Rotate & Press	On Control Panel around the Control Knob

© Bee Robotics Jan 2010

14.2 APPENDIX VII: MSDS for typical C100/200 Kit used with the MultiMag

Material Safety Data Sheet

I. Product Identification

Product Name (As Used on Label and List): **Catalog Number**:

Virus DNA/RNA Extraction Kit C100/200

Manufacturer's Name

Bee Robotics Ltd

Address **Telephone Number for Information**

32-33 Cibyn Industrial Estate, Caernarfon, Gwynedd, Wales, UK LL55 2BD + 44 (0)1286 672744

Emergency Telephone Number

+ 44 (0)1286 672744

II. Hazard Ingredients/Identity Information

Reagent	Hazardous Components	CAS No.	EC No.	Labelling according to EC Directives	Content
Lysis Buffer	Guanidin-Hydrochlorid	50-01-1	200-002-3	Xn R22-36/38	10-17%
	Triton X-100	9002-93-1		Xn R22-41	1-2%
Binding Buffer Green	Sorbitan Sesquioleate	8007-43-0		R36/37/38	2.5%
	Sodium Perchlorate	7601-89-0	231-511-9	Xn R22	25-30%
	Ethanol	64-17-5	200-578-6	F R10	35-45%
Wash Buffer White	Ethanol	64-17-5	200-578-6	F R10	20-25%
	Guanidin-Hydrochlorid	50-01-1	200-002-3	Xn R22-36/38	3-5%
	Sodium Perchlorate	7601-89-0	231-511-9	Xn R22	17-20%
	Triton X-100	9002-93-1		Xn R22-41	< 1%
Elution Buffer	*No hazardous ingredients*	1185-53-1			
Magnetic Beads	*No hazardous ingredients*				
Wash Buffer Yellow	*No hazardous ingredients*				

[* = Perchlorate solutions with concentrations below 70% are classified as non-oxidizing materials]

III. Health Hazard Data

Route(s) of Entry: Inhalation, Ingestion, Skin contact or eye contact from splashes

Inhalation Ethanol: may cause cough, drowsiness, headache or fatigue. Guanidine-Hydrochloride, Triton X-100 and Sodium perchlorate: may cause respiratory tract irritation

Ingestion Guanidine-Hydrochloride, Triton X-100 and Sodium perchlorate: may cause gastrointestinal irritation with nausea, vomiting and diarrhea

Skin contact Ethanol: may dry skin, cause skin discoloration with irritation Guanidine-Hydrochloride, Triton X-100 and Sodium perchlorate: may cause reddening, discomfort or mild irritation

Eye contact

© Bee Robotics Jan 2010

Splashes may cause reddening, discomfort or eye damage

Carcinogenicity:	**NTP?**	**IARC Monographs?**	**OSHA Regulated?**
not listed	N/A	N/A	N/A

Chronic Exposure:
Ethanol: may cause drying/cracking of skin. Repeated high exposure may damage liver, nervous system or blood cells Sodium perchlorate: Prolonged or repeated exposure may cause thyroid inhibition

IV. Medical Conditions Generally Aggravated by Exposure:
Persons with pre-existing skin disorders, eye problems or liver function may be more susceptible to the effects

V. Emergency and First Aid Procedures:
Inhalation If breathing becomes difficult, remove victim to fresh air. Seek medical assistance immediately.

Ingestion If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Skin contact If skin contact occurs, wash skin with water and remove contaminated clothing. If contact with product leads to continued reddening, inflammation after rinsing with water, get medical attention.

Eye contact
Flush eye(s) with large volumes of water for at least 15 minutes. Get medical attention immediately.

VI. Fire-fighting procedures
Extinguishing Media Use dry chemical, carbon dioxide (CO_2) or appropriate foam

Special Fire Fighting Procedures Wear self-contained breathing apparatus and full protective gear

Unusual Fire and Explosion Hazards Auto-ignition temperature of ethanol: 423 °C

VII. Precautions for Safe Handling and Use
Steps to Be Taken in Case Material is Released or Spilled: Wear appropriate personal protective clothing as specified in section IX. Use non-sparking tools and equipment (ethanol). Use an inert absorbent material (e.g. vermiculite, dry sand) to contain/pick up the spilled solution. Place all contaminated disposables into a suitable container, seal, label and hold for disposal.

Waste Disposal Method: Please consult local, state and federal regulations for additional guidance on disposal

VIII. Precautions to be taken in Handling and Storing:
Store in tightly closed containers. Ethanol: take measures against electrostatic loading. See package insert for further storage and handling information.

IX. Control Measures
Respiratory Protection: Respiratory protection is not required under normal use of this product.

Ventilation:
A system of local and/or general exhaust is recommended. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source.

Protective Gloves: Wear appropriate protective gloves to prevent skin contact	**Eye Protection**: Wear appropriate eye protection to prevent eye contact.

Other Protective Clothing or Equipment:
Wear appropriate body protection to prevent skin contact. Eye wash stations and deluge showers.

Work/Hygienic Practices:
Good laboratory technique should be used when handling this product. Observe appropriate chemical hygiene. Avoid contact with skin or eyes. Do not place in mouth.
Do not eat, drink or smoke while working with product. Upon completion of work activities involving this product, wash hands thoroughly with soap and water.

X. Physical/Chemical Characteristics

Boiling Point	N/A
Vapor Pressure (mm Hg.)	N/A
Vapor Density (AIR = 1)	N/A
Specific Gravity (H_2O = 1)	N/A
Melting Point	N/A
Evaporation Rate (Butyl Acetate = 1)	N/A
Solubility in Water:	Soluble in water

Appearance and Odour:
Magnetic Beads: suspension of brown polymer particles in water

© Bee Robotics Jan 2010

All other reagents: all bottles contain aqueous solutions

XI. Reactivity Data

Stability
Stable under normal handling and storage conditions

Incompatibility *(Materials to Avoid)*
Ethanol: strong oxidizing agents, potassium dioxide, bromine pentafluoride, acetyl bromide, acetyl chloride, platinum, sodium perchlorate: strong acids, finely powdered metals, magnesium, reducing agents (Perchlorate solutions with concentrations below 70% are classified as non-oxidizing materials) Guanidine-hydrochloride, sorbitan sesquioleate: strong oxidizing agents

Hazardous Decomposition or Byproducts
Guanidine-hydrochloride: Hydrogen chloride, nitrogen oxides, carbon monoxide, irritating and toxic fumes and gases, carbon dioxide Sodium perchlorate: Hydrogen chloride, chlorine, oxides of chlorine sorbitan sesquioleate: carbon monoxide, carbon dioxide

Hazardous Polymerization	**Conditions to Avoid**
no	Heat, flames, ignition sources, incompatibles

XII. Toxological Information

Toxicity Data: Sodium perchlorate (undiluted): LD50(rat, oral) = 2100 mg/kg. Guanidine-Hydrochloride (undiluted): LD50(mouse, oral) = 571 mg/kg; LD50(rat, oral) = 475 mg/kg. Ethanol: TDLo (man) = 1.4 g/kg; LD50(rat,oral) = 7060 mg/kg; Irritation (rabbit, skin) = 20 mg/24H=moderate reaction, (rabbit, eye)=500 mg/24H=mild, 500mg=severe.

Reproductive Effects:
Ethanol has been linked to birth defects in humans.

Carcinogenicity:
No

XIII. Ecological Information

Environmental fate/stability: Ethanol is expected to readily biodegrade when released into soil and water and is degraded when released into air.

Effect on material on plants or animals:
N/A

Effect of chemical on aquatic life:
Ethanol is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/L.

XIV. Disposal considerations

Product: There are no uniform EC Regulations for the disposal of chemicals or residues. Chemical residues generally count as special waste. The disposal of the latter is regulated in the EC member countries through corresponding laws and regulations. We recommend that you contact either the authorities in charge or approved waste disposal companies which will advise you on how to dispose of special waste.

Packaging:
Disposal in compliance with official regulations. Handle contaminated packaging in the same way as the substance itself. If not officially specified differently, non-contaminated packaging may be treated like household waste or recycled.

XV. Transport Information

Is this material hazardous?
Yes.

Proper shipping name: Ethanol

Hazard Class Number: 3 Packaging group: II UN Number: UN 1170

XVI. Other Information

© Bee Robotics Jan 2010